

What is claimed is:

1. A circuit board comprising:
a plurality of wiring patterns; and
5 a plurality of protrusions at desired locations
on said wiring patterns, wherein said protrusions and
wiring patterns comprise the same conductive material,
and the protrusions are coupled electrically with
electrodes on electronic component to be mounted on
10 said circuit board.
2. The circuit board as defined in Claim 1 wherein
said wiring patterns and said electrodes are unitary.
- 15 3. The circuit board as defined in Claim 1 wherein at
least one end of each of said protrusions is roughened.
4. The circuit board as defined in Claim 3 wherein
said board, said wiring patterns and said protrusions
20 have been etched or blasted.
5. The circuit board as defined in Claim 1 wherein
said protrusions are formed by one of Au paste and Ag-
Pd paste.
- 25 6. The circuit board as defined in Claim 1 wherein
said protrusions are plated by Au.
7. The circuit board as defined in Claim 5 wherein
30 said protrusions are plated by Au after solidification
of said protrusions.
8. The circuit board as defined in Claim 1 wherein end

faces of said protrusions opposite the circuit board have bumps thereon.

9. The circuit board as defined in Claim 1 wherein
5 said circuit board is a multi-layered board.

10. The circuit board as defined in Claim 1 wherein heights of said protrusions are level.

10 11. A semiconductor device comprising:

a circuit board comprising a substrate having a plurality of wiring patterns on said substrate;

said circuit board having a plurality of
protrusions at desired locations on said wiring
15 patterns, and said protrusions comprise the same conductive material used in said wiring patterns; and

a semiconductor chip component having electrodes thereon, with said protrusions electrically coupled to the electrodes on said semiconductor chip for mounting
20 the chip on said circuit board.

12. The semiconductor device as defined in Claim 11 wherein said wiring patterns and said protrusions are unitary.

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13. The semiconductor device as defined in Claim 11 wherein end face of each of said protrusions opposite the circuit board is roughened.

30 14. The semiconductor device as defined in Claim 11 wherein ends of said protrusions are electrically coupled to electrodes of said semiconductor chip component by metal bonding.

15. The semiconductor device as defined in Claim 11 wherein said protrusions comprise one of Au paste and gold plating, and the electrodes of said semiconductor chip component comprise Al.

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16. The semiconductor device as defined in Claim 15 wherein said protrusions are electrically coupled to the electrodes of said semiconductor chip component by eutectic bonding of Al-Au.

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17. The semiconductor device as defined in Claim 11 wherein said protrusions comprise Ag-Pd paste and the electrodes of said semiconductor chip component comprise Al.

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18. The semiconductor device as defined in Claim 17 wherein surfaces of the electrodes of said semiconductor chip component are plated by Au, and are coupled electrically to said protrusions via one of
20 conductive paste, anisotropic conductive resin, or and solder.

19. The semiconductor device as defined in Claim 15 wherein surfaces of the electrodes of said
25 semiconductor chip component are plated by Au, and are coupled electrically with said protrusions by Au-Au metallic bonding.

20. The semiconductor device as defined in Claim 11
30 wherein sealant is filled into a space between a lower face of said semiconductor chip component and said board.

21. The semiconductor device as defined in Claim 11 wherein said circuit board is a multi-layered board.

22. The semiconductor device as defined in Claim 11 wherein heights of said protrusions are leveled by imposing load thereto with one of a flat metallic plate and an electrode of said semiconductor chip component.

23. The semiconductor device as defined in Claim 18 wherein an end of said protrusion has a bump.

24. A method of manufacturing a circuit board comprising a plurality of wiring patterns and a plurality of protrusions disposed at desired locations on the wiring patterns on a substrate, wherein said method comprises simultaneously and unitarily forming the wiring patterns and the protrusions.

25. The method of manufacturing a circuit board as defined in Claim 24 wherein the wiring patterns and the protrusions are made of a same material.

26. The method of manufacturing a circuit board as defined in Claim 25 additionally comprising:

- forming a first groove on a film;
- forming a second groove at a desired location in the first groove;
- filling conductive material into the first and the second grooves;
- transferring the filled conductive material to the board; and
- firing the transferred conductive material.

27. The method of manufacturing a circuit board as defined in Claim 26 further comprising:

roughening at least part of a surface of the circuit board by one of chemical processing and
5 mechanical processing.

28. The method of manufacturing a circuit board as defined in Claim 27 further comprising:

roughening an end surface of a protrusion
10 opposite the circuit board by one of an etching process and a blast process.

29. A method of manufacturing a semiconductor device comprising:

15 (a) simultaneously and unitarily forming a plurality of wiring patterns and a plurality of protrusions at desired locations on the wiring patterns on a circuit board; and

(b) coupling electrically the protrusions on said
20 circuit board and electrodes on a semiconductor chip component.

30. The method of manufacturing a semiconductor device as defined in Claim 29 wherein the wiring patterns and
25 the protrusions are made of a same conductive material.

31. The method of manufacturing a semiconductor device as defined in Claim 30 wherein forming the wiring patterns and the protrusions of the same conductive
30 material comprises:

forming a first groove on a film;

forming a second groove at a desired location in the first groove;

filling conductive material into the first and the second grooves;

transferring the filled conductive material onto the circuit board; and

5 firing the transferred conductive material.

32. The method of manufacturing a semiconductor device as defined in Claim 31 further comprising:

roughening at least an end surface of the
10 protrusion by providing one of a chemical processing and a mechanical processing to the circuit board on which the protrusions and the wiring patterns are formed.

15 33. The method of manufacturing a semiconductor device as defined in Claim 32 wherein:

the chemical processing is etching, and
the mechanical processing is blasting.

20 34. The method of manufacturing a semiconductor device as defined in Claim 29 further comprising:

leveling the protrusions by imposing load thereto with one of a flat metallic plate and the electrode of a semiconductor chip component, before electrically
25 coupling the protrusions on said circuit board and the electrodes on said semiconductor chip component.